



Center for Braille Innovation Leveraging Braille Technology for Future Generations

National Braille Press (NBP) is a non-profit organization whose mission is to promote the literacy of blind children through braille, and to print and publish reading material, including original works developed by NBP, in braille for blind people of all ages to fully pursue their chosen endeavors in education, work, and life. Established in 1927 to provide blind people with the first weekly braille newspaper, NBP has grown to produce over 12 million pages of braille annually, including hundreds of textbooks and standardized tests, children's books, magazines, novels for the Library of Congress, and product manuals.

NBP is refining its strategic plan and taking a leadership role to research, develop and produce specific affordable accessible technology products that will help promote braille literacy for young readers, and support blind students and adults in school and in the workplace environment. While paper braille will not disappear in the immediate future, NBP believes that it is equally important for blind people to have accessible technology to for text messaging, e-mail, downloading textbooks, and reading novels. Access to information that the digital age provides is critical for all people, especially the blind and visually impaired population, who traditionally have had many barriers to information access. Yet currently, the cost of adaptive technology for the blind is 900% more than similar products for sighted people.

In order to accomplish this new strategic direction, Brian Mac Donald launched the Center for Braille Innovation (CBI) in 2008 to provide braille information faster and more efficiently, in a variety of formats, and with new technologies that allow blind people to keep pace with the world around them. This transition into e-braille technologies are the cornerstone of our new direction as we move forward to ensure the general integration of accessible technology into mainstream products for work, daily living, household items, and public information.

Braille is Literacy

There is no substitute for the ability to read. For blind people, braille is the only medium that allows for true literacy. Tape recorders and synthesized speech are useful tools, but they are inadequate substitutes for reading and writing. Braille literacy plays the same key role in a blind person's life that print literacy does in a sighted person's—it increases opportunities. Research shows that braille literacy directly correlates with academic achievement and employment. The correlation is clear - braille *is* literacy for blind people, and it is a critical component that supports educational advancement and increases employment prospects.



Braille and Employment

The majority of working age blind people are unemployed, (74 percent) and depend on support such as disability income benefits. It is estimated that the lost productivity due to blindness and eye diseases is \$8.0 billion per year in the United States¹. Of the remaining 26 percent of blind people who are employed, nearly 90% are braille readers.

Despite the link between braille literacy and employment, braille literacy rates for school-age blind children have declined from greater than 50 percent (40 years ago) to only 12 percent today. Part of the reason for this decline can be attributed to the mainstreaming of blind students into the public school system, where significantly less time is available for learning braille.

Listening is Not Reading

Another factor is that many people believed that talking computers would replace the need to learn braille. However, listening alone is not enough. Research shows that braille provides a critical advantage for students to learn grammar, language, math and science. Similarly, supporting materials such as two dimensional tactile diagrams and graphics are an important supplement for comprehending complex concepts and for converting printed graphs, charts, and pictures to a format that blind people can use.

Center for Braille Innovation (CBI)

New advances in technology are progressing at one of the most rapid paces in history, and the need to develop a hub for imaginative new ideas, inventive tools, and professional expertise, was the impetus for the Center for Braille Innovation. Through CBI, National Braille Press is committed to break down barriers to information access for blind people by using braille and tactile-based technology.

With technology changing daily, blind people need a variety of accessible and affordable braille tools to read, learn. Since blindness is such a low-incident population, market forces result in companies commanding higher prices for products accessible to blind people in order to get their desired return on investment. We know that we must expand our efforts to ensure that blind people have the tools and resources to thrive in school and work environments which are largely computer driven, but we must also create a new business model to ensure that these products are affordable. The Center for Braille Innovation is taking on this challenge, and the first product is a refreshable braille PDA/notetaker.

Team CBI

Initially Mac Donald recruited a core team of engineers and researchers, with experience from IBM, Motorola, and private firms. Four members of the team are blind, including an engineer, a technology writer, a university research professor, and the other, Paul

¹ The Economic Impact of Vision Problems, Prevent Blindness America.



Parravano, Chairman of the Board at NBP, is an administrator in government relations at MIT. In addition, Deane Blazie, is the Senior Engineer for Team CBI, who is well known for inventing a successful line of braille computer products for blind people (Braille 'n Speak, Braille Lite, and Braille Lite 40). Since its inception, Team CBI has expanded its partnerships to include the NFB (National Federation of the Blind), APH (American Printing House for the Blind), AFB (American Foundation for the Blind), ACB (American Council for the Blind), the World Braille Foundation, and the China Braille Press in Beijing. Other research is being conducted using EAPs (Electro-Active Polymers), which is a potential refreshable braille technology, with the NASA Jet Propulsion Lab at Cal Tech, and the University of Tokyo. National Braille Press is also collaborating with the IBM Global Human Ability and Accessibility Center, and the Massachusetts Institute of Technology.

The First Tool

The team's first project is to develop a refreshable braille PDA for blind students and adults that will sell for approximately one-third of the price of existing notetakers, which currently average \$6,000. This price reduction will significantly increase the number of blind individuals that are able to own a refreshable braille tool that has more features, and an open source platform to encourage applications to be developed. As a not for profit organization, National Braille Press's primary goal is to provide access to as many blind people to these products, by selling the PDA's at the lowest price possible.

Other Projects:

E-Products:

The portable refreshable braille PDA (don't change the name mid document) in development now is the first of a suite of e-braille product options being researched. National Braille Press is also working on a separate concept for a very low priced electro-magnetic/mechanical braille product for children, and a full page refreshable braille page display, similar in size to an e-reader. We are exploring the possibility that this approach could also create tactile graphics to support textbook diagrams and images in storybooks for children. This device will aid children in the learning of braille as well as allow them the ability to participate fully in the classroom. All the e-braille tools that we develop will be designed with non-proprietary power adaptors, earphones and accessories, with an open source platform to encourage the development of educational and personal software. (this last sentence is moved up from the last paragraph – it seemed out of place there – its key info., not a conclusion)

Tactile Graphics Solutions:

Today, more than 50 percent of the content in printed text books is images and graphics. National Braille Press is well known for its high quality production of tactile graphics for standardized tests and textbooks, however the process is very labor intensive, making each original mold by hand with clay, foil, string and other materials to represent math, science



and geographical diagrams. National Braille Press produces over 20,000 tactiles for textbooks and standardized tests every year, and a key goal of CBI is to improve this process by developing new methods to mass produce high quality tactile graphics more efficiently.

Looking forward

National Braille Press hears frequently from its constituents including parents of blind children, blind adults, their family members, and teachers of the visually impaired. It is clear that there is a need for a variety of braille tools to read, learn, and communicate. There will always be a place for paper braille production. In particular, young children need to learn braille and the joy of reading by starting with books like *Goodnight Moon* and *Curious George*. With this foundation, they can extend their literacy skills to reading on a refreshable braille display, composing email, term papers, or documents for work.

National Braille Press will continue to strive to be a resource for a wide range of braille products to extend accessible technologies in all phases of human activity. We will continue to produce high quality braille books and other documents on paper, while we research and develop methods to transition affordable e-devices for blind people on a global scale. NBP is still seeking support from foundations, the government and corporations to achieve this goal. This will help blind students to succeed in the classroom and blind adults to compete and be productive members of the workforce.

For more information contact:

Brian Mac Donald
President
contactus@nbp.org

